Tuned using the frequency analyser (HM5014-2) to the corresponding Larmor frequency of 64MHz for 1.5T MRI (GE, Signa), occluders were implanted into a freshly excised porcine heart and Thiel soft embalmed human heart under MRI guidance. 0.9% NaCl solution bath was used as the medium. Two MRI resonant markers were placed on the delivery system to position the occluders with the right orientation. Real time sequences were used for the visualization during the implantation (MS, FGRE, TR=10 ms-50 ms, TE=2.4 ms-4 ms and small flip angles of 15-30° with standard head coil). To keep the hearts in the right orientation, a holding device made of acrylic plates was manufactured.
Results: The in-vitro test results showed a local image contrast enhancement of up to 4 times at low flip angles of about 10°-15°. The locally improved contrast in the MR images was relative homogenous and showed no artefacts. The MRI guided implantation in both fresh porcine and Thiel soft embalmed human hearts was successful. The MRI resonant markers on the delivery system enabled the correct positioning of the occluders. An exact differentiation between the MR-Enhancing implant and tissue were obtained in all views.
Conclusions: MRI guided implantation of occluders can be improved with resonant circuits integrated into the design of the implant. The locally enhanced MRI signal creates a better contrast between the tissue and the implant and enables accurate MRI guided delivery, and non-invasive follow up examination.

TCT-815

Positive Vascular Remodeling and Plaque Vulnerability: Biological Insights from the Novel Familial Hypercholesterolemic Swine Model of Atherosclerosis

Masahiko Shibuya[1], Armando Tellez[1], Yanping Cheng[1], Carlos A. Gongora[1], Athanasios Peppas[1], Matthew Purdy[1], Samantha G. Stone[1], William Rate[1], Christian Krueger[2], Dhanansayan Shanmuganayagam[2], Greg L. Kaluza[1], Juan Granada[1]
[1]Cardiovascular Research Foundation, Orangeburg , NY, [2]University of Wisconsin, Madison, WI

Background: Pathology studies have shown correlation between positive vascular remodeling and plaque characteristics in humans. In this study we aimed to correlate the presence of in vivo vascular remodeling with the presence of histological features of plaque vulnerability in the novel familial hypercholesterolemic swine (FHS) model of atherosclerosis.
Methods: Fifteen naïve coronary arteries of 3-year-old FHS were imaged with angiography and intravascular ultrasound (IVUS) to identify native plaques. Remodeling index (RI) was defined as the area of the external elastic lamina (EEL) within the plaque divided by the EEL in the proximal reference by IVUS. Analyzed plaques were allocated into positive (RI >1.0) and negative remodeling (RI ≤ 1.0) categories. After imaging, coronaries were harvested and sectioned every 3-5 mm intervals. Each section was stained with Movat's pentachrome stain and evaluated for complex atherosclerotic features such as calcification, plaque hemorrhage and necrotic core.
Results: Twenty three plaques were found and 43% (n=10) displayed positive remodeling. Percent diameter of stenosis did not show significant difference between plaques with positive or negative remodeling (RI>1.0, 55.7±22.0 % versus RI ≤1.0, 45.5±20.0 %, p=0.3). Histological comparison revealed plaques with positive remodeling contained higher incidence of necrotic core (RI>1.0, 90% versus RI ≤1.0, 46.1% p=0.03), necrotic core area (RI>1.0, 2.23±0.6 mm2 versus RI ≤1.0, 1.34±0.7 mm2, p=0.03), and thinner fibrous cap (RI>1.0, 172±102 mm versus RI ≤1.0, 312±129 mm, p=0.023) than plaques with negative remodeling. Plaque hemorrhage (RI>1.0, 40 % versus RI ≤1.0, 0 % p=0.02) and calcification (RI>1.0, 60 % versus RI ≤1.0, 15.3 % p=0.03) was also more frequently observed in plaques with positive remodeling.
Conclusions: The FHS model displays human-like vascular remodeling features. Alike in humans, these features correlate to histopathological characteristics of plaque vulnerability.

TCT-816

Transcatheter Orthotopic Aortic Valve Implantation In Sheep: Chronic Survival And Valve Performance Evaluation

Jeannot Potvin[1], Keith D. Dawkins[2], Dominic J. Allocco[3], Amelie Bouchard[4], Robert Chang[5], Barbara Huibregtse[6], Lise Lachance[5], Guy LeClerc[7]
[1]Centre Hospitalier de l'Universite de Montreal (CHUM), Montreal, Quebec, [2]Boston Scientific Corporation, Natick, MA, [3]Boston Scientific Corporation, Maple Grove, MN, [4]AccelLab Inc, Broisbriand, Quebec, [5]Boston Scientific Corporation, Los Gatos, CA, [6]Boston Scientific Corporation, Marlborough, MA, [7]AccelLab Inc, Broisbriand, Quebec

Background: Pre-clinical studies of transcatheter aortic valve implantation (TAVI) systems have traditionally been conducted on surgically implanted valves in the mitral position or on valves placed in the descending aorta. Very limited data exist on orthotopic TAVI utilizing animal models.
Methods: Cardiac and aortic anatomy of juvenile-adolescent Dorset sheep was determined with 3D reconstruction of CT-scan images. Animals with appropriate measurements were selected for transfemoral TAVI with a 27mm Lotus™ Valve System (Boston Scientific, Natick, US). Procedural guidance combined intracardiac echocardiography (ICE) and fluoroscopy. Valve performance was assessed at implant (ICE) and 90 days (transthoracic echocardiography [TTE])
Results: Valve deployment was attempted on 15 animals. Successful implantation with >72h survival was achieved in 80% of the cases (12/15). One sheep was survived to 7 days, 3 to 30 days and 8 to 140 days (73% scheduled survival rate [11/15]). Complete AV block was observed in 2 cases. Immediate post-implantation valve evaluation revealed: no paravalvular leak (PVL) in 92% (12/13), mild PVL in one case and normal function with a mean mean transvalvular gradient of 4.1 mmHg (range 1.2 to 7.7 mmHg). Ninety-day TTE showed a mean mean gradient of 29.1 mmHg (range 13.5 to 47.0 mmHg). Animals gained an average 5.1kg per month during follow-up. Histology showed no endocarditis and minimal inflammation at 30 days (140 day data pending).
Conclusions: Chronic survival rate in this non-diseased ovine model was excellent. To our knowledge this represents the first description of successful TAVI in the native aortic position in a chronic animal study. The Lotus valve's fully repositionable design allowed precise positioning and provided adequate performance at 90 days. Adolescent and juvenile sheep are well-known models of accelerated bioprostheses calcification which, combined with significant animal growth, likely explain the increase in mean gradient at follow-up. Long term (140 day) histology will provide relevant insight on valve behaviour in this novel animal model of orthotopic TAVI.

TCT-817

Hemodynamic Challenges and Efficacy of Vasodilator-enhanced Antegrade Intracoronary AAV9 Gene Delivery with and without Coronary Sinus Blockage

Felix Woitek[1], MaryKathryn Hurst[1], Jeffrey C. Powers[1], Anna M. Kulczycki[1], Amy Lam[1], Abdelkarim Sabri[2], Fabio A. Recchia[1]
[1]Temple University - School of Medicine, Philadelphia, PA, [2]Temple University - School of Medicine, Phialdelphia, PA

Background: Cardiac gene therapy represents one of the future therapeutic strategies for cardiomyopathy but methods and measures of efficacy vary widely. The aim of this current study was to test an antegrade coronary approach for AAV9 delivery in combination with vasodilators and concomitant retrograde blockage of the coronary sinus in a pre-clinical large animal model.
Methods: The approach was tested in 14 chronically instrumented dogs which received the vector intracoronarily. The left main coronary artery was cannulated with a 5F EBU 3.5 or C1 catheter and a 2.5F micro-infusion catheter was selectively advanced into the target vessel. The solution for infusion was prepared with 10^13 AAV9-GFP particles, saline, SubstanceP (0.25ng/kg/min) and Adenosine (0.15mg/kg/min) and injected slowly over 20min. To further enhance endothelial penetration nitrogycerine was given i.v. (1µg/kg/min). The coronary sinus was approached with a custom made balloon in seven subjects which was inflated during the infusion. Hemodynamic data were recorded during the procedure and infection efficacy was assessed using immunohistochemistry after 30days.
Results: The procedure was successful in all cases. Procedure time was significantly longer in the cases with coronary sinus occlusion (58±12 vs. 93±48min, p<0.05). Mean arterial pressure (MAP) and dP/dtmax dropped in all cases (116±17 to 49±19mmHg and 2332±487 to 1466±454mmHg/sec) whereas the mean coronary flow increased from 14±6 to 18±7mL/min. These effects were enhanced with coronary sinus blockage where infusion had to be discontinued during the procedure several times in three cases due to hypotension (MAP 40mmHg±11mmHg with and 59±9mmHg without coronary sinus blockage). The GFP-transduction rate was heterogeneous within the myocardial layers (0.5-55%). There was no significant increase of GFP-expression caused by the additional coronary sinus blockage (p=0.08).
Conclusions: Antegrade intracoronary gene delivery is feasible, comparatively effective and can be enhanced with vasodilators. The addition of coronary sinus blockage during infusion increases the complexity and risk of the procedure in some cases and might not be translatable for heart failure patients.

TCT-818

Plaque analysis of femoral, carotid and coronary arteries

Ilka Ott[1], Melanie Straub[2], Salvatore Cassese[3]
[1]Deutsches Herzzentrum, München, Germany, [2]Institut für Pathologie, München, Germany, [3]Deutsches Herzzentrum, Munich, BAVARIA

Background: Atherosclerosis seems to affect arteries in a site-specific pattern. Remodeling processes, frequency of acute thrombotic complications and restenosis-rates differ in various vascular beds. For a better understanding of site-specific differences we analyzed plaque morphology and gene expression in femoral, carotid and coronary arteries.
Methods: Coronary vessels were obtained from 16 patients with coronary artery disease, carotid arteries from 10 and femoral arteries from 9 patients with peripheral occlusive disease (PAD). Microscopic sections were analyzed blindly on